sage of only just enough gas to keep the burners alight; but at eight o'clock, when the weight *l* drops, it raises the handle *o*, and quite opens the cock *p*, by which the dial is instantly illuminated. It will be seen by the dotted place of the lever *l*, fig. 3, that there are seven hours before the first pin will touch it, and two hours more will quite raise the lever, slowly closing the cock *p* as at first, where it will remain till all the pins have passed the lever.

Fig. 4 represents the lever *l* down, and the pins nearly beginning to raise it; by removing two pins, one at each end, the clock will open the gas-cock one hour sooner, and nearly close it one hour later. By successively removing the pins as the days shorten, and replacing them as the days lengthen, the clock is accommodated to all seasons.

Fig. 4 shows the wheels arranged in one line on one bar *k k;* fig. 5 is a top view of them. The whole space is kept clear between the lights and the dial, except only the axis *c*, fig. 2; and the lights being placed on each side of this, and having a large reflector, no shadow is perceived from it.

XIX.—IMPROVED LATHE CHUCK.

The LARGE SILVER MEDAL *was this Session given to Mr.* J. BOWER, *of Clerkenwell-green, for his* IMPROVED LATHE CHUCK, *for Engine-turners, a Model of which has been placed in the Society's Repository.*

SIR; May 9, 1827.

I BEG leave to submit, for the consideration of the Society of Arts, the accompanying lathe-chuck, the object of which is to *turn*, if so it may be called, a straight

line of any given length which the height of the lathe will admit of, and any segment of a circle with the ordinary rotatory motion of the fly-wheel of the lathe.

The straight line chuck at present in use requires the lathe to be turned backwards and forwards, for the length of line required with a very slow motion by hand, which leaves the workman but one hand at liberty for the management of his tool, and no other means but the eye to guide his work.

The principal object of this chuck is to assist the inexperienced workman in engine-turning, and amateur turners to make their stops at any given part required.

The two specimens sent are merely to show the accuracy with which the length of lines and parts of circles may be obtained, with a very great saving of time; the chuck at present is in a rude unfinished state, but time would not allow me to finish it more completely, as I particularly wish the opinion of the Society concerning it during the present session. Should the Society require any further information, or have a wish to see it at work, I shall be happy to wait upon them at the time appointed, having the lathe that it is made for in hand, in a forward state; and should the Society think it worthy of any honorary reward, I shall feel a pleasure in placing either drawings or a model in the repository of the Society.

I am, Sir,

A. Aikin, Esq. &c. &c. &c.

Secretary, &c. &c. JOHN BOWER.

The straight line or chuck at present in use among the engine-turners requires to be moved backwards and forwards by one hand, with a very slow motion, leaving the workman only the other at liberty for the management

of the tool, and no guide for the truth of his work but the eye.

The chuck invented by Mr. Bower produces the alternate motion of the work by the continued movement in one direction of the mandril of the lathe, and enables the workman to make his stops with accuracy at any part that may be required.

This is effected by placing on the mandril a plate which has an eccentric stud loosely attached to one end of an iron bar, the other end of which is in like manner attached to the extremity of a brass arm projecting from a plate, which thus receives an alternate sliding motion; to each end of this sliding piece is fixed a chain, the middle of which is coiled round the axis of the mandril which carries the work, and thus gives it a movement of rotation first in one direction and then in the other; or, by the removal of a pin, converts the alternate rotatory, into an alternate sliding, motion. The tool is fixed in a slide rest.

Trial was made before the committee, of Mr. Bower's chuck, and from the testimony of several professional engine-turners and mechanics who were present, it appears to be a decided and important improvement on those now in use.

Reference to the Engraving.—Plate IX.

Fig. 1 is a front view of the lathe head; fig. 2 a side view.

Fig. 3, the same, partly in section, and fig. 4 a top view; *a a* the head which supports the mandril *b; c c c c* the additional part; it is a metal box, having the parallel steel bars *d d* and *e e* firmly screwed to it; this is fixed

to the lathe head by screws, and then forms part of it; the screw of the mandril *b* projects through the bottom of this box, to receive the brass chuck *f f*, figs. 1 and 3. Fig. 5 shows the chuck separate; this chuck *f* contains an adjusting screw to move the sliding stud *g* to or from the centre; *h*, a bar connected to the stud *g*, and at top by a double stud *k k* to a sliding-plate *i i*, shown separate in figs. 6 and 7; this plate slides between the bars *d d*, fig. 4. The stud *g*, while describing a circle, communicates an up-and-down motion to the plate *i i* exactly the length of its diameter, by means of the connecting bar *h*; a hole *j* is made in the side of the box *c c*, fig. 2, to introduce a key to the adjusting screw of the stud *g*, and fix it for the required length of line. Between the parallel bars *e e* slides another plate *l l*, shown separately in figs. 8, 9, and 10; to this plate is attached the sliding frame *m m* of the eccentric chuck.

Figs. 8 and 10 show a steel ring *n* let into the plate *l*, to form a true bed for the frame *m*, fig. 9, to turn on.

Fig. 11 is an end view of the sliding frame *m m*; *o* the axis which passes through the plate *l*, and is then squared to receive the chain roller *p*; the frame *m*, the plate *b*, and roller *p* are then secured together by the screw *q*.

Fig. 12, *r* the sliding plate and stud on which the chuck *s*, shown in section, turns. The eccentric chuck, though fixed to and turning on the plate *l*, receives its circular motion from the sliding plate *i*, by means of the chain attached to that plate by the studs *t* and *u*, after passing round the roller *p*, to which the middle link is attached: *v* the screw which moves the slide. When turning a straight line, the sliding plates *l* and *i* are secured together by a pin passing through the hole *w*, or *á*, fig. 9, and through the adjusting piece *x*, which slides along the opening *b'*, fig. 6; the frame *m m* is also pinned to the plate *l* at the holes *z z*, figs. 8 and 9, and all moves

up and down together. A line thus turned is equally above and below the centre; but to turn a line in any particular place, the frame *m m* is set free to turn, and the work brought up or down to the required place by the adjusting screw *c'*, which moves the sliding-piece *x*, and carries the front plate *l* with it, the chain then only holding the frame *m* from turning. To turn a segment, the pin is taken from the holes *w* and *x*, figs. 6 and 9, and the outer plate *l* is pinned to the bar *e* by the corresponding holes *y y*, the frame *m* being at liberty to turn; then the up-and-down motion of the plate *i*, by means of the chain, turns the eccentric chuck round; the length of the segments, as well as the straight lines, are always governed by the diameter in which the stud *g* revolves; as the motion of the lathe is direct and continuous, the eccentric chuck, and its wheel *s*, allow any part of the work to be brought in any position required to the turning tool; *d'*, figs. 8, 9, and 10, is an index which traverses the divisions *é é*, fig. 1, to measure the quantity above or below the centre.

In combining this straight up-and-down motion with the rose engine, the divisions do not gradate equally at each end like the geometrical projection of the rosette on a plane surface, but like a very oblique perspective representation of those divisions; this inequality, however, diminishes inversely as the connecting bar *h* and plate *i* lengthen. But if, instead of using the connecting bar *h*, the stud *g* enters direct a piece *f'*, which slides between the horizontal parallel bars *h' h'* at the back of the plate *i* (shown only half the size in fig. 13), the patterns then taken from the rosette will be given in the geometrical projection of a perfect semicircle, because the line is always a diameter of the revolution that produced it: some of these patterns are shown in fig. 14.